

**TUTU WELL SITE
POTABLE WATER ALTERNATIVES REPORT
ANNA'S RETREAT, ST. THOMAS, U.S. VIRGIN ISLANDS**

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September 1989

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
	LIST OF TABLES	ii
	LIST OF FIGURES	iii
	LIST OF APPENDICES	iv
1.0	SYNOPSIS	
1.1	Summary	1
1.2	Conclusions and Recommendations	1
2.0	SITE DESCRIPTION AND CONDITIONS	1
2.1	Site Background and Conditions	2
2.2	Sampling Results	2
3.0	DRINKING WATER STANDARDS	6
3.1	EPA Regulations	7
3.2	U.S.V.I. Regulations	7
4.0	PROPOSED ACTION	9
4.1	Project Scope	9
4.2	Detailed Costs	11
4.3	Implementation Schedule	11
	APPENDICES	14
		27

TITLE

LIST OF TABLES

	<u>PAGE</u>
2-1 Current Well Monitoring Program at Tutu Well Site	16
2-2 Highest Amount of Contamination Detected On Photovac From September 1987 to January 1988	17/18
2-3 Highest Amount of Contamination Confirmed by GC/MS From September 1987 to January 1988	19/20
2-4 Metals and Cyanide Concentration at Tutu Well Sites During October 1987 Sampling	21
3-1 Primary Drinking Water Regulations For Inorganics	22
3-2 Primary Drinking Water Regulations For Organics	22
3-3 National Secondary Drinking Water Standards	23
3-4 1980 Water Quality Criteria Based On Health for Non-Carcinogenic (Threshold) Pollutants	24/25
3- Maximum Contaminant Levels Established by the U.S, Virgin Islands	26

LIST OF FIGURES

<u>TITLE</u>	<u>PAGE</u>
2-1 Site Location Map	3
2-2 Well Location Map, Tutu St. Thomas	5
4-1 EPA Proposed Lateral Connections	10
4-2 Proposed Work Schedule	15

LIST OF APPENDICES

APPENDIX

Action Memo

A

POLREPS

B

Well Sampling Results

C

1.0 SYNOPSIS

1.1 Summary

On July 16, 1987, the U.S. EPA received a request from the U.S. Virgin Islands (USVI) Department of Planning and Natural Resources (DPNR) to sample and analyze one well, which exhibited a strong unpleasant odor, in the Tutu area of St. Thomas. This well was used as a main source of drinking water supply on the eastern portion of the island. Subsequently, samples were taken from 6 additional wells which service residential customers in the immediate area. Eventually a total of 24 wells; 14 commercial, 6 private, 3 institutional and 1 public in the Tutu area, were sampled and analyzed. Also, a total of 123 cisterns serviced by water haulers from this area were sampled and analyzed. Analytical results showed 3 wells with contaminants above the 175 ppb Health Advisory level for PCE and 8 wells above the recommended maximum volatile organic compound (VOC) levels in drinking water. Twenty four (24) well samples showed the presence of 1-2-transdichloroethylene (DCE), trichloroethylene (TCE), tetrachloroethylene (PCE), toluene (TOL), benzene (BEN) and tertbutyl methyl ether (TBME) in concentrations ranging from 61 parts per billion (ppb) to 120,000 ppb. Based on these results, 13 commercial and 5 private wells were ordered closed. Also, 5 cisterns were found to be contaminated. These cisterns were cleaned, disinfected and filled with high quality drinking water.

EPA also conducted a Hazardous Substance List (HSL) analysis on the twenty four (24) wells to confirm the previous analyses. Results of this latest HSL testing showed the presence of additional metal contamination. Three (3) of the wells tested, showed high VOC and metals concentrations such as arsenic (15 ppb) selenium (15 ppb) and zinc (340 ppb).

Based on prior sampling results, EPA initiated a limited CERCLA removal action by providing water truck deliveries to fill three cisterns. The three cisterns serve an estimated 50 persons in two homes and one apartment complex. On December 3, 1987, EPA initiated a study to consider various alternatives to find a safe and permanent potable water supply for the affected homes. The initial phase of the study is contained herein.

1.2 Conclusions and Recommendations

In order to provide a permanent water supply to the two three family homes and one apartment building housing twelve studio units; the EPA had considered the

following alternatives: no action; extend the existing water main; install new and deeper wells within the contamination area; install new wells beyond the area of contamination; install a whole house reverse osmosis unit at each location; construct a reverse osmosis central plant; construct a water treatment plant; increase the capacity of the cisterns; and install individual activated carbon filters.

The Virgin Islands Housing Authority (VIHA) received a grant from the Federal Housing and Urban Development (HUD) to extend a water main to serve the Bovoni housing project, this water main has been constructed. EPA will connect two laterals to the existing water main, one, a 2 inch diameter polyvinyl chloride (PVC) pipe, to service Messrs. Steele and Harvey and the second, a 6 inch diameter ductile iron pipe (DIP) to serve Ms. Smith. The cost for these laterals, including a fire hydrant on the 6 inch pipe as required by the Fire Code is \$220,000.

2.0 SITE DESCRIPTION AND CONDITIONS

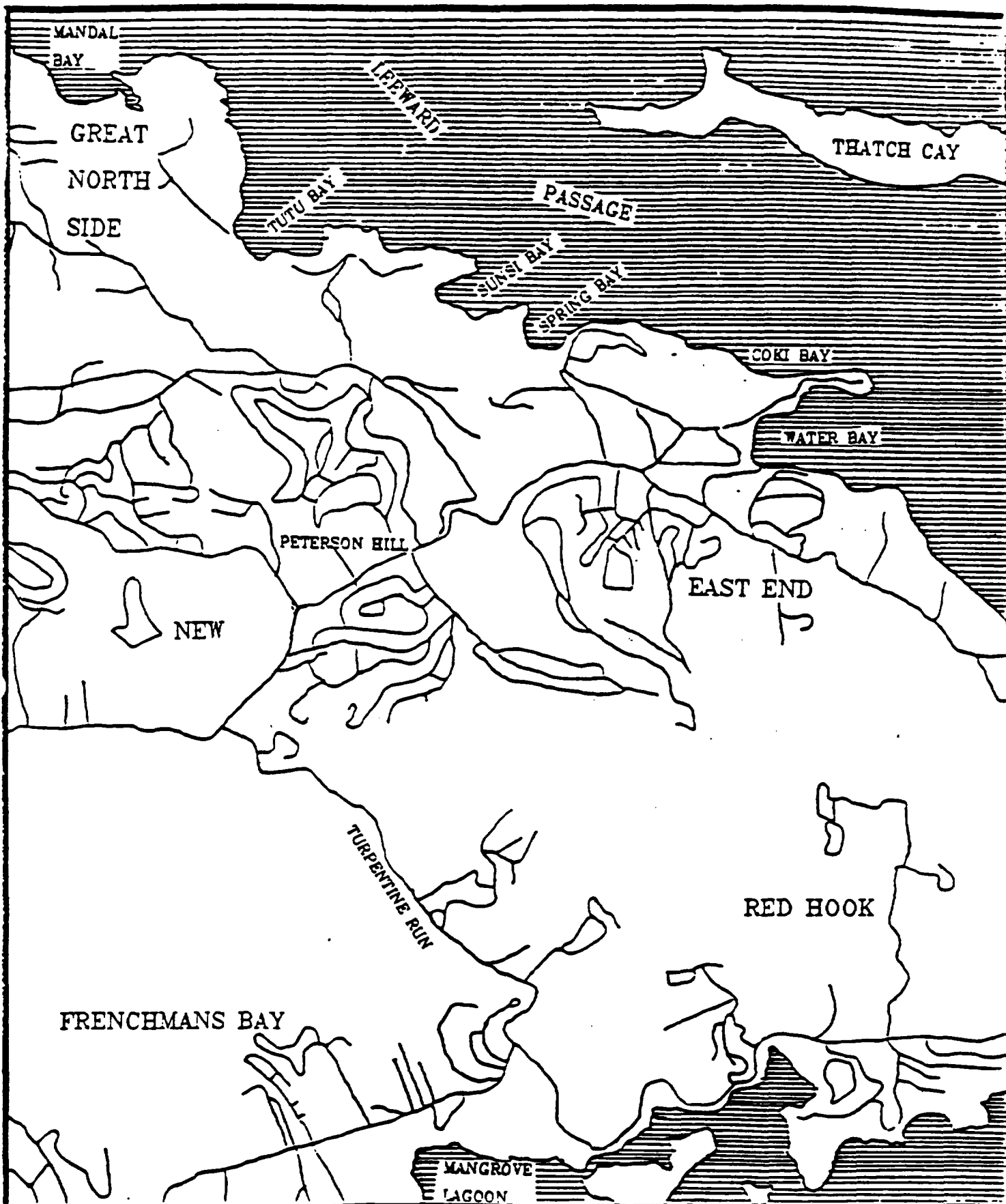
2.1 Site Background and Conditions

G: TUTU
The Tutu Well site is located at the eastern end of the Island at the Anna's Retreat Section of St. Thomas (see Figure 2-1 page 3. Most of the wells are used for public drinking water supply.

On, or about July 7, 1987, Mr. Eric Tillett, contacted the DPNR regarding an odor emanating from the raw well water on his property located at Anna's Retreat, St. Thomas, USVI.

On July 16, 1987, the EPA received a request from the DPNR in St. Thomas, for sampling and analyses of several wells in Tutu. On July 21, the EPA and its Technical Assistance Team (TAT) contractor, Roy F. Weston, Inc., mobilized to St. Thomas, to perform sampling on the drinking water wells suspected of being contaminated. These wells were also reported to have a strong, unpleasant odor and were found to be contaminated with hazardous substances and petroleum products coming from two gas stations in the Tutu area.

The EPA and TAT in coordination with DPNR, initiated sampling of wells in the affected area in July 1987. The test results showed the presence of high concentrations of gasoline and chlorinated organic compounds. Seven wells: Elgin, Four Winds, Harthman, and VIHA were closed down by order of DPNR due to high VOC concentrations.



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EPA PM

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FIGURE 2-1
SITE LOCATION MAP
TUTU ST. THOMAS
U.S. VIRGIN ISLAND

Several of the wells in this area are major commercial well services used for public drinking water supply; therefore, the incident was classified as major, and the DPNR Commissioner requested the EPA to assume the role of Lead Agency. The well locations can be seen in Figure 2-2 page 5 .

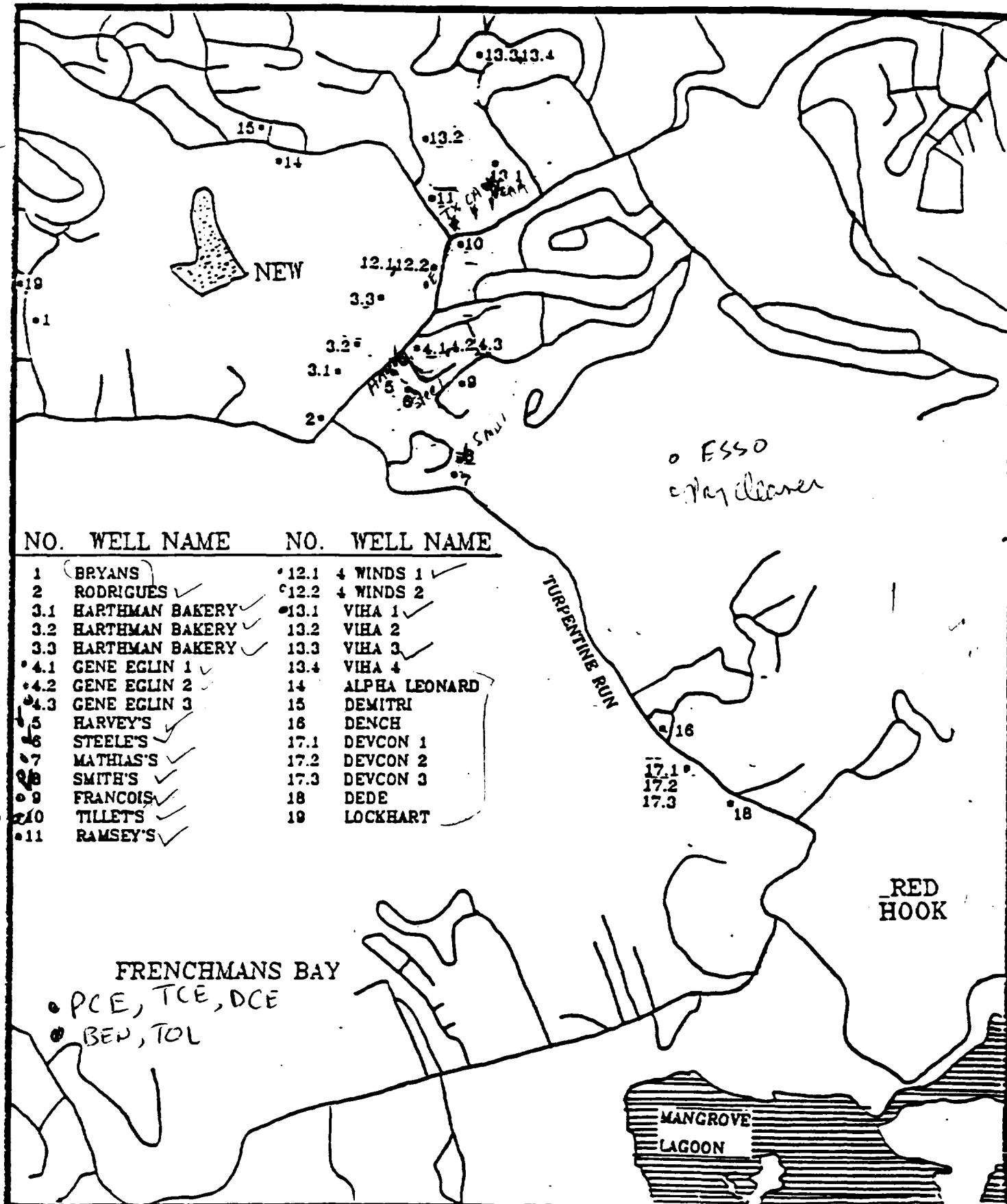
A Texaco station, located opposite the Tillet Well, is suspected as a possible source of contamination. A Petrotight test conducted on the underground storage tanks at this facility indicated leaks in two of the three tanks. These failures may have contributed to the groundwater pollution problem, resulting in the contamination of nearby wells. Another suspected source of contamination is the Tutu Esso gas station. This facility uses and stores waste oil in an underground storage tank. The facility has had problems in the past with leakage from their underground gasoline storage tank and is suspected of using solvents in the mechanic shop. At the time of inspection, the nature of the problem had not been determined.

Another suspected origin of PCE contamination is the O'Henry Laundromat. In September 1988, an EPA contractor obtained three soil samples at this facility, the composite of these samples showed 440 ppm of PCE.

EPA continued its efforts towards the identification of; affected wells in the area, customers which had received water from contaminated wells, and possible alternate water supplies and remedial action alternatives.

A testing program of wells located outside of the known area of contamination was conducted to evaluate those areas as possible alternate water supply sources.

Sampling of cisterns served by the contaminated wells was also performed. EPA directed the Emergency Response Cleanup Services contractor (ERCS) to; clean and disinfect the five (5) cisterns which had tested positive for PCE, modify the existing home plumbing, disconnect the contaminated wells, and dispose of the contaminated water. At EPA's direction, ERCS also contracted a local water hauler to deliver uncontaminated drinking water to the cisterns by tank truck. A well sampling program was established by the EPA to monitor the wells at the Tutu site for a one year period.



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FIGURE 2-2

WELL LOCATION MAP

TUTU ST. THOMAS

U.S. VIRGIN ISLAND

2.2 Sampling Results

The Tutu well site has been sampled repeatedly over the last two years and found to contain definite contamination. The initial assessment was conducted in July through September of 1987. Subsequent sampling and analysis has proceeded on a regular basis. The initial assessment considered 24 wells and approximately 50 cisterns, of which 24 wells and 5 cisterns were found to be contaminated. The 5 cisterns were cleaned and disinfected by the ERCS contractor. Subsequent monitoring has been considered for the 24 wells that showed some type of contamination.

Table 2-1 pg. 16, lists the wells included in the current sampling program. Tables 2-2 and 2-3, pages 17 and 19, show the volatile organic analysis results of the contaminated wells and give the highest concentration of organic contamination found during the last six months.

The sampling, and most of the preliminary Photovac portable GC screening was conducted by the U.S. EPA Region II TAT. Certified drinking water laboratories have performed formal analyses to verify the Photovac screening results and to cover the entire spectrum of possible hazardous contaminants.

Although, the concentration of these contaminants fluctuates monthly, it is noteworthy that the major contaminants have been DCE, TCE, PCE, TOL, BEN, TBME and various metals. Their high concentration in four wells; Tillet, Harvey, Smith and Steele has been evident from the initial assessment. These wells show concentrations of VOC in excess of 1,000 ppb. The major and most consistent contaminant appears to be PCE. The Tillet well has also shown very high DCE and BEN contamination. Four other wells; Francois, Mathias, Four Winds, and Elgin; were confirmed to have >50 ppb VOCs.

The last confirmation analysis conducted during October 1987, included the entire Hazardous Substance List (HSL) consisting of approximately 150 chemicals. At that time, significant levels of TBME up to 470 ppb, and methylene chloride up to 120,000 ppb were detected. Some samples have also shown traces of vinyl chloride, chloroform, 1,1,1-trichloroethane, bromodichloroethane, xylene, and ethylbenzene.

Finally, the HSL analysis also showed the presence of EP toxic metals. The report showed the presence of eight distinct metals in some of the wells examined See Table 2-4 page 21. Zinc was the most abundant element detected at a level of 460 ug/l. Selenium was also measured in two wells (VIHA #1 and Steele) at concentrations exceeding the Primary Drinking Water Regulations (PDWR) limit of 10 ug/l.

In summary, the Tutu Wells Site monitoring has indicated persistent contamination in the well drinking water and the need for immediate remediation.

3.0 DRINKING WATER STANDARDS

3.1 EPA Regulations

The Safe Drinking Water Act of 1974, and amended in 1977, established primary and secondary drinking water standards. The primary standards were established to protect public health, while the secondary standards mainly addressed the physical characteristics of drinking water such as taste, odor, color and corrosivity. See Tables 3-1, 3-2, and 3-3, pages 22 and 23.

The Maximum Contaminant Level (MCL) and the Recommended Maximum Contaminant Level (RMCL) were developed by the EPA Office of Drinking Water to provide acceptable concentrations of specific organics and inorganics in public water supply systems. RMCL's are contaminant levels at which there are no known or anticipated adverse health effects to a human being. MCL's are enforceable health standards that are set as close to the RMCL's as feasible based upon practical considerations such as treatment technology, cost, analytical methods and detection limits.

Removal Action Levels (OSWER Directive 9360.1-10)

Under the 1982 National Contingency Plan (NCP), removal actions were taken in response to "immediate and significant" threats to human health or the environment. The removal program used the 10-Day Health Advisory as the principal benchmark to identify those drinking water contamination incidents that posed the most acute threats to human health. The November 1985 NCP broadened removal authority by authorizing response in situations that present a "threat" to human health or the environment. Therefore, removal actions may now be taken in less urgent situations than under the 1982 NCP.

The action level for methylene chloride, for example, is calculated as follows. Methylene chloride is a volatile and a potential human carcinogen (classified as a "B2" under EPA guidelines). The DWEL for methylene chloride equals 1750 ppb and the 10^{-4} Cancer Risk Level equals 48 ppb. The action level is determined by comparing 50 percent of the DWEL, or 875 ppb, to the 10^{-4} Cancer Risk Level, or 48 ppb, and choosing the lower of the two, which is 48ppb.

The following is a summary of the maximum concentrations of the primary pollutants found in the contaminated wells and the statutory source for their designation as a hazardous substance under CERCLA.

<u>Contaminant</u>	<u>Maximum Concentration Found (ppb)</u>	<u>Removal Action Level (ppb)</u>	<u>Statutory Sources For Designation As A Hazardous Substance Under CERCLA</u>
Methylene Chloride	120,000	48	Clean Water Act Sec. 307(a)
Tetrachloroethylene	2,040	66	Clean Water Act Sec. 307(a)
Trichloroethylene (TCE)	711	128	Clean Water Act Sec. 311(b)(4)
Trans 1-2,Dichloroethylene (DCE)	620	175	Clean Water Act Sec. 307(a)
Benzene (BEN)	6,950	120	Clean Water Act Sec. 307(a)
Selenium	15	10	Clean Water Act Sec. 307(a)

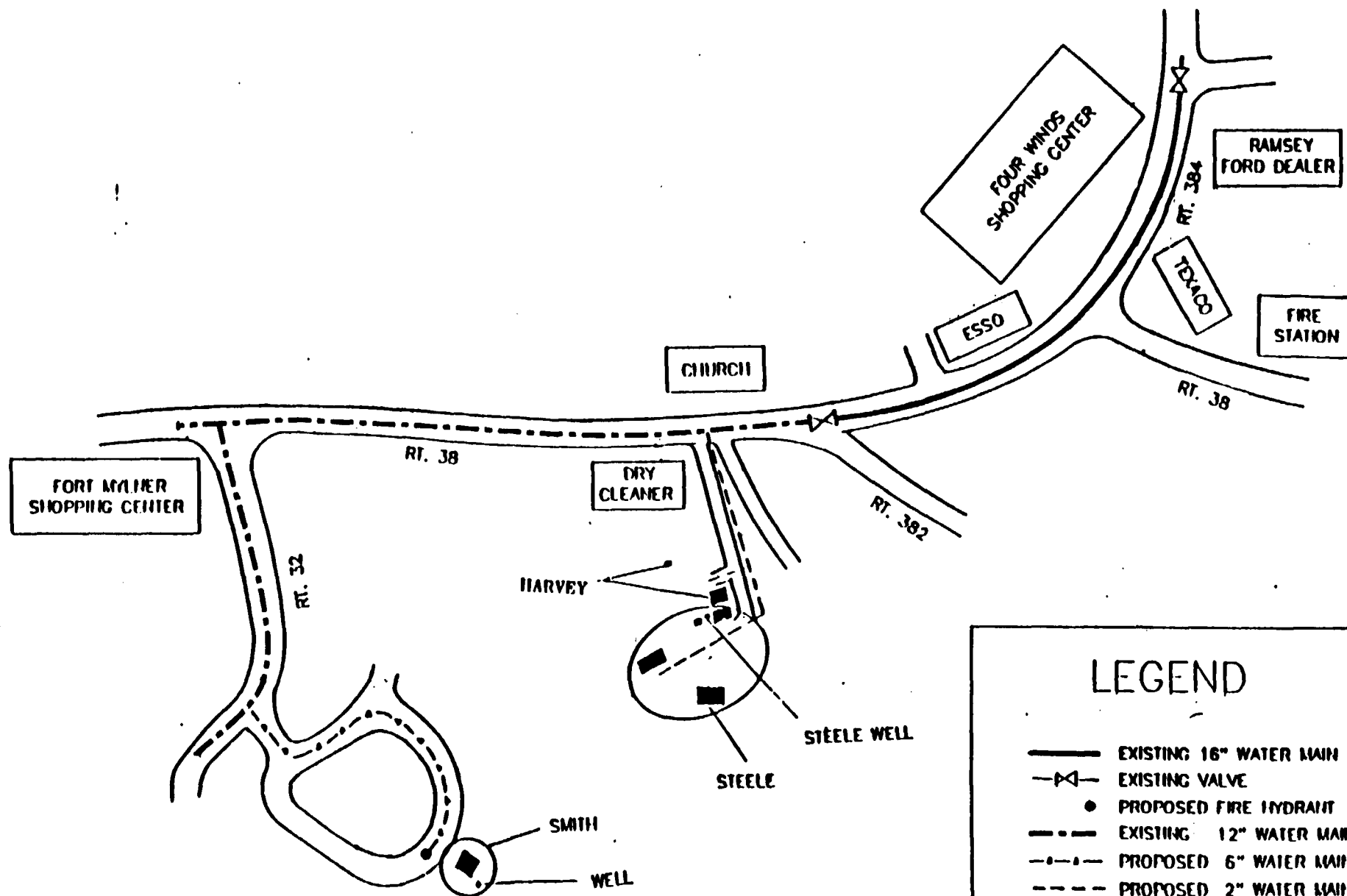
3.2 USVI Department of Planning and Natural Resources Regulations

On September 1, 1987, the DPNR adopted interim maximum permissible concentrations for VOC in drinking water, 50 ppb for a single compound, or 100 ppb for total organic compounds. See table 3-5 page 26 for other maximum contaminant levels established in the USVI.

4.0 PROPOSED ACTION

The VIHA received a grant from the HUD to extend a 12 inch dia. watermain to the Bovoni Housing Project. This watermain has already been constructed.

The proposed action is to connect two laterals to the existing 12 inch dia. watermain and tie in Messrs. Harvey, Smith and Steele. See Figure 4-1, on the following page.



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**FIGURE 4-1
EPA PROPOSED LATERAL
CONNECTIONS
TUTU, ST. THOMAS
U.S. VIRGIN ISLANDS**

4.1 Project Scope

The scope of this project would be to install approximately 1000 feet of 2" PVC pipe from the existing 12" main along the roadway leading to the Harvey and Steele homes. The Harvey and Steele cisterns would then be connected to this 2" line using 3/4" copper tubing. The cistern at the Smith residence will be connected to the 6 inch lateral using 3/4" copper tubing. Water meters will be installed at each residence and the existing contaminated wells will be capped.

4.2 Detailed Costs

The detailed costs for the connection to the existing 12" diameter water main. were based on average daily production rates for the various tasks taken from the Means Construction Cost data book and from TAT conversations with USVI Officials and one contractor.

The estimate provides for funding to the engineering company for the survey, profile drawings, piping design for the Route 32 Circle, checking of existing pipe drawings and specifications.

The costs assume that the laterals, the 6" dia. pipe will be ductile iron pipe, cement lined, class 250; and that polyvinyl chloride 2" dia. pipe will be installed from the water main up to the house cisterns at Steele and Harvey, house connections will be made as per current WAPA specifications and will include water meters. It is further assumed that the PVC pipe will be installed concurrently with the 6 inch DIP installation. Pipe fittings, disinfection, trenching, filling, compaction and road restoration are included in the installation costs per linear feet of pipe.

Project costs for this work is summarized on the following pages.

Project costs for the installation of a 6 inch diameter ductile iron pipe (DIP) to the Smith's residence and a 2 inch diameter plastic (PVC) pipe to the Steele's and Harvey residences, including the three houses (cisterns) connections.

The costs are based on a 12 hour day and 5 days per week (60 hours/week). Length of pipe installed per 12 hour day: 100 L.F. of 6" diameter DIP, 175 L.F. of 2" PVC pipe.

I. EXTRAMURAL COSTS

A. ERCS Contractor Costs

a) Engineering

Survey, profile drawings, specifications and construction inspections	\$ 15,000
--	-----------

b) Labor and Material

Mobilization and Demobilization	\$ 7,500
950 L.F. 6" dia. @ \$53 L.F.	50,350
1000 L.F. 2" dia. DIP @ 7 L.F.	7,000
1 Hydrant @ \$2,800	2,800
1 Valve @ \$500	500
3 house connections \$500 ea.	1,500
Restauration of two existing areas @ \$2,000 each	<u>4,000</u>

Subtotal a & b	\$ 88,650
ERCS Surcharge 10%	<u>8,865</u>
SUBTOTAL MITIGATION COSTS	\$ 97,515

c) ERCS Cost

Response Manager (Level 3)	
15 days at 12 hour days x \$55/hr	\$ 9,900
15 days per diem at \$180/day	2,700
Clerk typist (NJ) 60 hrs. @ \$29/hr	1,740
Two (5) airfares Newark-St. Thomas at \$500/each	1,000
Rental Car 15 days @ \$55/day	825
Equipment	1,000
Office Trailer, \$320/wk x 3 wks	<u>960</u>

SUBTOTAL	\$ 18,125
-----------------	------------------

Subtotal Mitigation Costs	\$ 115,640
---------------------------	------------

(a + b + c)

* Contingency 25%	28,910
(0.25 x \$115,640)	

Total Mitigation Costs	\$ 144,550
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Rounded Mitigation Contracting Costs	\$ 144,500
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Carried forward (Mitigation Contracting Costs) \$ 144,500

B. TAT Costs

10 days @ 8 hours x \$71/hr	\$ 5,680
15 days @ 12 hours/day x \$71/hr	12,780
Office support 100 hours x \$56/hr	5,600
5 weekends @ 2 days/weekend @ \$180/day	1,800
Five (5) airfares Newark - St. Thomas at \$500/each	2,500
Four (4) airfares Puerto Rico - St. Thomas at \$80/each	\$ 320
Subtotal	\$ 28,680
Contingency (15%)	\$ 4,302
Total TAT Cost	\$ 32,982
Rounded TAT Cost	\$ 33,000

II. Intramural Costs

100 hrs (Region) + 100 x .10 (HTQ) @ x \$30/hr.	\$ 3,300
Intramural Indirect Cost	
100 hrs X \$68	\$ 6,800
Per diem 15 days @ \$180/day	\$ 2,700
Rental car 15 days x \$45/day	\$ 675
Four (4) airfares Puerto Rico - St. Thomas at \$80/each	\$ 320
Total Intramural Costs	\$ 13,795
Subtotal (I + II)	\$ 191,295
Contingency (15%)	\$ 28,694
Total Project Costs	\$ 219,989
Rounded Intramural Costs	\$ 220,000

*Modified Contingency percentage from 15% to 25% due to unknown labor costs, in U.S.V.I.

4.3 Implementation Schedule

The implementation schedule is presented in Figure 4-2, following page. The figure shows a total of five (5) weeks of scheduled tasks. Two weeks (10 days) of the schedule have been allocated to the survey, profile drawings, specifications and permits. Two additional weeks will be used installing the 6 inch diameter DIP and the 2 inch diameter PVC pipes, including excavation, backfill and resurfacing of the road. The last week will be assigned to the disinfection of the installed water main laterals and the three house connections.

TAT will be in St. Thomas during the five weeks. During the first two weeks, TAT will be making certain that the appropriate permits are obtained, while directing the work of the engineer. During the last three weeks, TAT will be monitoring the contractor.

FIGURE 4-2
PROPOSED WORK SCHEDULE
(WEEKS)

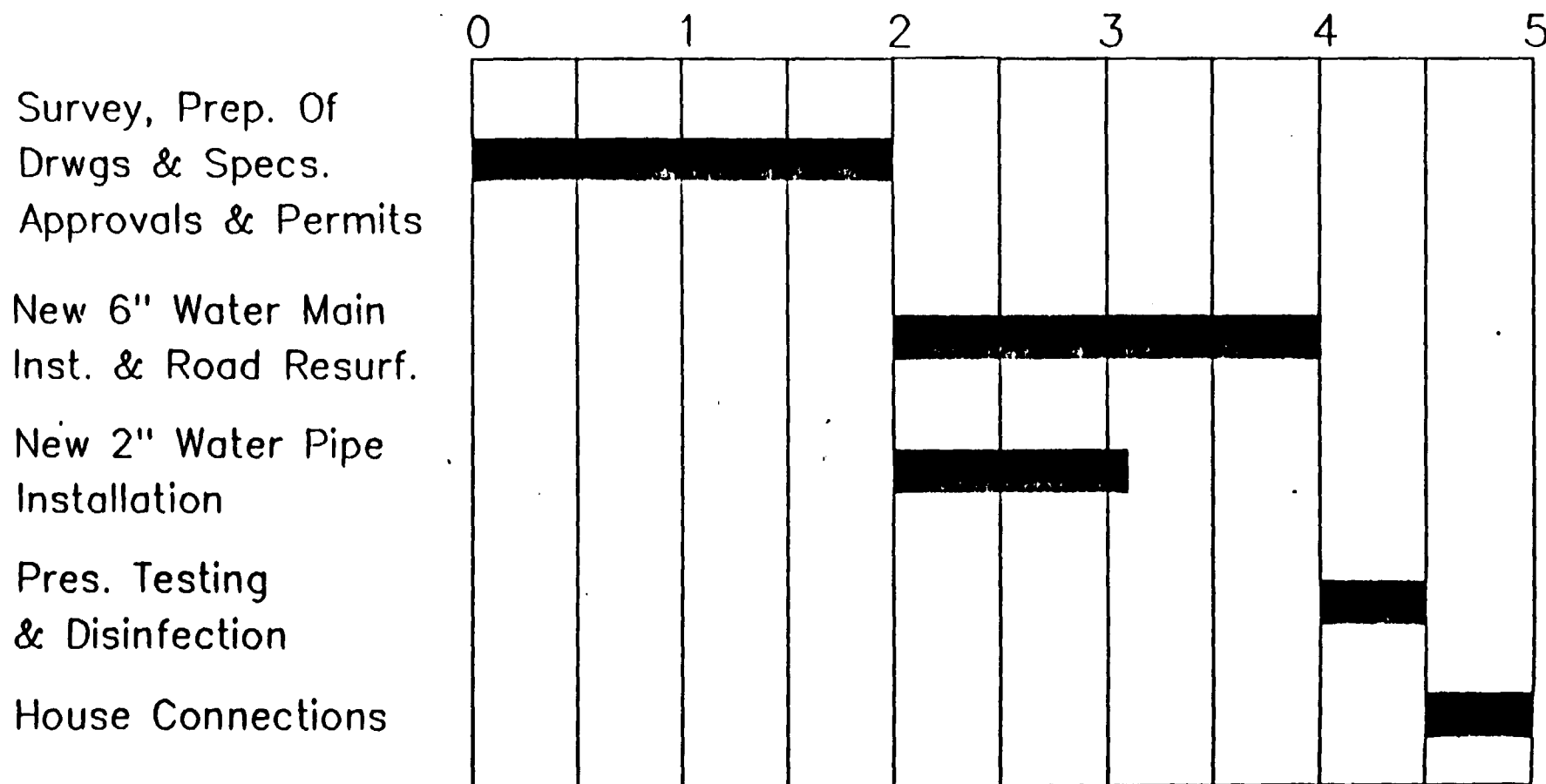


TABLE 2-1
CURRENT WELL MONITORING PROGRAM
AND CLASSIFICATION AT TUTU WELL SITE

<u>WELL NAME</u>	<u>CLASSIFICATION</u>	<u>OPEN/CLOSED</u>
1. Dede	Public	Open
2. Steele	Private	Closed
3. Elgin #1	Commercial	Closed
Elgin #2	Commercial	Closed
Elgin #3	Commercial	Closed
4. Four Winds	Commercial	Closed
5. Smith	Private	Closed
6. Bryan	Commercial	Open
7. Harvey	Private	Closed
8. Tillet	Commercial	Closed
9. Harthman Estate	Private	Closed
10. Devcon #1	Commercial	Open
Devcon #3	Commercial	Open
11. VIHA #1	Institutional	Closed
VIHA #3	Institutional	Closed
12. Dench	Commercial	Pump/No Power
13. Ramsey	Private	Open
14. Harthman Crusher	Commercial	Closed
15. Alpha Leonard	Private	Open
16. Francois	Private	Open
17. Demitris	Commercial	Open
18. Rodriguez Auto	Private	Open
19. Harthman Bakery	Commercial	Closed
20. Mathias	Private	Open

Definition of Classifications

Private: Wells which serve one or two houses.

Commercial: Wells that are used to yield water for sale.

Institutional: Wells owned and operated by a non-profit institution or governmental agency.

Public: Wells that are for public use.

TABLE 2-2

HIGHEST AMOUNT OF CONTAMINATION
DETECTED ON PHOTOVAC FROM
SEPTEMBER 1987 TO JANUARY 1988

CONTAMINANT (PPB)					
WELL	BEN	TOL	PCE	TCE	DCE
EGLIN #2	ND	< 5	40	10	< 5
EGLIN #3	ND	1	105	< 20	< 5
SMITH	ND	ND	>25	7	< 1
TILLET	ND	250	475	75	< 10
4 WINDS	ND	2	125	< 15	5
STEELE	ND	ND	575	9	< 5
HARVEY	ND	ND	500-2500	15	< 1
DEMETRIS	ND	ND	ND	ND	ND
DEDE	ND	ND	ND	ND	ND
DEVCON #1	ND	ND	ND	ND	ND
DEVCON #3	ND	ND	ND	ND	ND
VIHA #1	ND	ND	14	< 1	0
VIHA #3	ND	ND	ND	<<1	ND
EGLIN #3	ND	1	60	<10	<5
DENCH	ND	ND	ND	ND	ND
RAMSEY	ND	ND	8	<<1	ND
H. CRUSHE	ND	ND	14	1	<1
H. BAKERY	ND	ND	1	<1	ND
H. ESTATE	ND	ND	ND	ND	ND
LEONARD	ND	ND	ND	ND	ND
FRANCOIS	ND	1	180	25	5
RODRIGUEZ	ND	ND	ND	ND	ND

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TABLE 2-2 (cont'd)

HIGHEST AMOUNT OF CONTAMINATION
DETECTED ON PHOTOVAC FROM
SEPTEMBER 1987 TO JANUARY 1988

CONTAMINANT (PPB)					
WELL	BEN	TOL	PCE	TCE	DCE
BRYAN	ND	ND	ND	ND	ND
MATHAIS	ND	ND	118	3	<1
RAL	120	ND	66	128	175

LEGEND:

< LESS THAN

> GREATER THAN

BEN BENZENE

TOL TOLUENE

PCE PERCHLOROETHYLENE

TCE TRICHLOROETHYLENE

DCE 1,1-DICHLOROETHYLENE

ND NOT DETECTED

TABLE 2-3

HIGHEST AMOUNT OF CONTAMINATION
 CONFIRMED BY GC/MS FROM
 SEPTEMBER 1987 TO JANUARY 1988

CONTAMINANT (PPB)						
WELL	BEN	TOL	PCE	TCE	DCE	TBME*
DENCH	0	0	0	0	1	
RAMSEY	5	30	154	46	3	0
H. CRUSHER	5	38	130	46	12	0
H. BAKERY	<1	633	3	5	<1	
H. ESTATE	<1	1	3	0	0	
LEONARD	0	1	3	0	0	0
FRANCOIS	0	1	>1000	180	140	180
DEMETRIS	<1	3	4	2	<1	
DEDE	<1	0	0	< 1	1	
DEVCON #1	0	0	0	< 1	< 1	
DEVCON #3	0	0	0	0	< 1	
EGLIN #1	2	5	450	300	63	
EGLIN #2	3	6	760	404	74	
EGLIN #3	0	1	500	268	66	
SMITH	1	1	>1000	130	81	34
4 WINDS	7	6	450	100	213	470
STEELE	0	0	>1000	160	61	37
HARVEY **	0	1	760	350	56	
RODRIGUEZ	0	0	1	<1	<1	
BRYAN	0	0	0	<1	0	
MATHAIS	0	1	6348	<55	9	
VIHA #1	15	6	36	9	12	

TABLE 2-3 (cont'd)

HIGHEST AMOUNT OF CONTAMINATION
 CONFIRMED BY GC/MS FROM
 SEPTEMBER 1987 TO JANUARY 1988

WELL	CONTAMINANT (PPB)					
	BEN	TOL	PCE	TCE	DCE	TBME*
VIHA #3	<1	3	2	1	7	
TILLET	6950	492	2040	711	620	470
RAL	120		66	128	175	

* FROM 10/87 HSL ANALYSIS BY EPA

** SHOWED A CONCENTRATION OF 120,000 PPB METHYLENE CHLORIDE IN
 THE 10/87 HSL

LEGEND

BEN BENZENE
 TOL TOLUENE
 PCE PERCHLOROETHYLENE
 TCE TRICHLOROETHYLENE
 DCE 1,1-DICHLOROETHYLENE
 RAL EPA REMOVAL ACTION LEVEL

TABLE 2-4
METALS AND CYANIDE CONCENTRATIONS
AT TUTU WELL SITE DURING
NSL OCTOBER 1987 SAMPLING

		Contaminant (ug/l)							
Well		Cyanide (mg/l)	Antimony	Arsenic	Chromium	Copper	Selenium	Thallium	Zinc
Field Blank		0.016M							10
Bryan									30
Tillet		0.051M			8M	10M			10
Four Winds					6M	5M			51
Elgin #3					6M	5M		3M	98
Elgin #2						8M			200
Elgin #1		0.058				5M			82
Francois		0.018M			9M				108
VI Housing#1		0.023				10M	13*		30
VI Housing#3		0.019M				22M	3M		30
Harthman									
Estate							4M		20
Demitri						20J	3M		40
Rodriguez						5M			30
Ramsey		0.018	2M						10
Steele			3M		20M	20M	15*		20
Harvey					10M	8M			340
Mathias						9M	5.6		10
Smith						7M	3M		460
Devcon#1									10
Devcon#2					10M		7.1		20
A. Leonard							8.5		10
H. Crusher				15					10
Dede						10M			30
Dench			4M			10M		12*	68
H. Bakery			1M						20
Drinking Water									
Standard				50 ug/l		1	10 ug/l		500 ug/l
Guidelines		220,000				1,400,000			

M = Detected but not quantified

J = Estimated

* = Significant value

Note: In lab report all units are ug/l except cyanide which is reported as mg/l

TABLE 3-1 PRIMARY DRINKING WATER REGULATIONS
FOR INORGANICS (40 CFR, PART 141)

<u>Contaminant</u>	<u>[(mg/l)]</u>
Arsenic	0.05
Barium	1
Cadmium	0.010
Chromium	0.05
Fluoride	1.4-2.4
Lead	0.05
Mercury	0.002
Nitrate (as N)	10
Selenium	0.01
Silver	0.05

TABLE 3-2 PRIMARY DRINKING WATER REGULATIONS
FOR ORGANICS (40 CFR, PART 141)

<u>Contaminant</u>	<u>Maximum Level</u> <u>[(mg/l)]</u>
(a) <u>Pesticides</u>	
Endrin	0.0002
Lindane	0.004
Methoxychlor	0.1
Toxaphene	0.0005
(b) <u>Chlorophenoxys</u>	
2,4-D, (2,4-Dichlorophenoxyacetic acid)	0.1
2,4,5-TP (Silvex) (2,4,5,-trichlorophenoxypropionic acid)	0.01
(c) <u>Total trihalomethanes</u>	0.10

TABLE 3-3 NATIONAL SECONDARY DRINKING WATER STANDARDS
(40 CFR, PART 143)

<u>Contaminant</u>	<u>Maximum Level</u>
Chloride	250 mg/l
Color	15 color units
Copper	1 mg/l
Corrosivity	Non-corrosive
Foaming Agents	0.5 mg/l
Iron	0.3 mg/l
Manganese	0.05 mg/l
Odor	Threshold Odor Number 3
pH	6.5 - 8.5
Sulfate	250 mg/l
TDS	500 mg/l
Zinc	5 mg/l

TABLE 3-4
1987 WATER QUALITY CRITERIA BASED ON HEALTH FOR NON-CARCINOGENIC
(THRESHOLD) POLLUTANTS

<u>Substance</u>	<u>Criterion^a</u> <u>(ug/l)</u>	<u>Comment</u>
Acenaphthalene	20	Organoleptic properties
Acrolein	320	
Antimony	145	
Cadmium	10	
Chlorobenzene	20	
bis-(2-chloroisopropyl)ether	34.7	
Chlorophenols (all mono isomers)	0.1	Organoleptic properties
Chromium (VI)	50	
Chromium (III)	170,000	
Copper	1,000	
Cyanide	200	
Dibutylphthalate	34,000	
Dichlorobenzenes (all isomers)	400	
2,3-dichlorophenol	0.04	Organoleptic properties
2,4-dichlorophenol	3,090	
	0.3	Organoleptic properties
2,5-dichlorophenol	0.5	Organoleptic properties
2,6-dichlorophenol	0.2	Organoleptic properties
3,4-dichlorophenol	0.3	Organoleptic properties
1,3-Dichloropropenes	87	
Di-2-ethylhexyl phthalate	15,000	
Diethylphthalate	350,000	
2,4-dimethyl phenol	400	Organoleptic properties
Dimethyl phthalate	313,000	
2,4-dinitro-o-cresol	13.4	
2,4-Dinitrophenol	70	
Endosulfan	74	
Endrin	1	
Ethylbenzene	1,400	
Fluoranthene	42	
Hexachlorocyclopentadiene	1.0	Organoleptic properties
Isophorone	5,200	
Lead	50	
Mercury	0.144	
2-methyl-4-chlorophenol	1,800	Organoleptic properties
3-methyl-4-chlorophenol	3,000	Organoleptic properties
3-methyl-6-chlorophenol	20	
Nickel	13.4	
Nitrobenzene	30	Organoleptic properties

TABLE 3-4
1987 WATER QUALITY CRITERIA BASED ON HEALTH FOR NON-CARCINOGENIC
(THRESHOLD) POLLUTANTS
(Continued)

<u>Substance</u>	<u>Criterion ^a</u> <u>(ug/l)</u>	<u>Comment</u>
Pentachlorophenol	30	Organoleptic properties
Phenol	3,500	Organoleptic properties
Selenium	10	
Silver	50	
2,3,4,6-tetrachlorophenol	1.0	Organoleptic properties
Thallium	13	
Toluene	14,300	
1,1,1-trichloroethane	18,400	
2,4,5-trichlorophenol	1.0	Organoleptic properties
Zinc	5,000	Organoleptic properties

^a Unless otherwise indicated, the criterion is based on ingestion of water and contaminated organisms.

TABLE 3-5
MAXIMUM CONTAMINANT LEVELS ESTABLISHED BY THE
U.S. VIRGIN ISLANDS

<u>Contaminant</u>	Maximum Contaminant <u>Level (ppb)</u>
Arsenic	50
Barium	1000
Cadmium	10
Chromium VI	50
Chromium III	50
2,4,-Dichlorophenoxyacetic acid (2,4-D)	100
Endrin	0.2
Lead	50
Lindane	4
Mercury	2
Methoxychlor	100
Nitrates	10
Selenium	10
Silver	50
Toxaphene	5
2,4,5-Trichlorophenoxypropionic acid (2,4,5-TP)	10

APPENDICES

APPENDIX

Action Memo

A

POLREPS

B

Well Sampling Results

C

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: July 14, 1987

Region II
Response and Prevention Branch
Edison, New Jersey 08837

TO: C. Daggett, EPA
S. Luftig, EPA
F. Rubel, EPA
J. Marshall, EPA
ERD Washington,
(E-Mail)
USCG 7th District (mep)
G. Zachos, EPA
B. Sprague, EPA
P. Gelabert, EPA
T. Taccone, EPA
A. Smith, EPA
J. Lee, DOI
TAT

(201) 548-8730 - Commercial and FTS
24 Hour Emergency

POLREP NO.: One (1)
INCIDENT NAME: Tutu Well Site
POLLUTANT: Gasoline
CLASSIFICATION: Potential Major
SOURCE: Underground gasoline storage tank
LOCATION: Wheymouth-Rhymer Highway, Tutu
St. Thomas, Virgin Islands
AMOUNT: Unknown, greater than 100 gallons
WATER BODY: Caribbean Sea, Atlantic Ocean
and Groundwater

1. SITUATION:

A. On July 16, 1987, the U.S. EPA received a request from the Department of Planning and Natural Resources (DPNR) [(formally known as the Department of Conservation and Cultural Affairs (DCCA)] St. Thomas, Virgin Island (VI) for analytical support in the sampling of several wells which were reported to exhibit a strong unpleasant odor. The wells, several of which are major well services used for distribution of the public drinking water supply, are located on the eastern end of the island in the Tutu section of Annas Retreat St. Thomas, VI.

B. The sources of contamination is as of the present unknown. A suspected source is a local Texaco Station which had exhibited poor storage practices in the past. A petrotight test was conducted at this service station in the early part of July resulting in the failure of two of three tanks. Further information on the extent of tank leakage has not been forwarded to the DPNR or the U.S. EPA UST Program Director.

2. ACTION TAKEN:

A. On July 21, 1987, U.S. EPA and their Technical Assistance Team contractor Roy F. Weston, Inc. responded to the VI to assist the DPNR in well sampling and provide analytical services to determine the extent of contamination.

B. On July 22, 1987, samples from six wells were collected and sent to a laboratory in New Jersey for volatile organic analysis and total organic carbon content.

C. No product was discovered in the wells, therefore, no fingerprinting analysis could be performed by the USCG Coil Laboratory.

D. On Thursday, July 23, 1987, DPNR held a meeting with Texaco, to discuss an implementation schedule and work plan for the Texaco Station.

Cause Codes: (M) - Tank failure

(G) - Lack of indicator/detection equipment

3. FUTURE PLANS AND RECOMMENDATIONS:

A. U.S. EPA will forward sample results to DPNR as soon as they are received.

B. DPNR will formally notify Texaco in writing as to the proper cleanup practices to initiate at this site to ensure compliance with VI and Federal regulations.

FINAL POLREP _____ FURTHER
(TAT) POLREPS FORTHCOMING X SUBMITTED BY: Paula A. Cammarata
Paula Cammarata, OSC
Response and Prevention
Branch

DATE RELEASED: 7-31-87

TUT 002 0661

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: July 31, 1987

Region II
Response and Preventive Branch-
Edison, New Jersey 08837

(201) 548-8730 - Commercial & FTS
24 Hour Emergency

TO: C. Daggett, EPA
S. Luftig, EPA
R. Salkie, EPA
F. Rubel, EPA
P. Gelabert, EPA
J. Marshall, EPA
W. Sawyer, EPA
ERD Washington
(E-Mail)
J. Czapor
USCG 7th District (mep)
G. Zachos, EPA
B. Sprague, EPA
T. Taccone, EPA
A. Smith, DPNR
J. Lee, DOI
J. Zark, USGS
TAT

POLREP NO. Two (2)
INCIDENT/SITE NO.: Tutu Well Site
POLLUTANT: Gasoline , Solvents, Volatile Organics
CLASSIFICATION: Potential Major
SOURCE: Underground Gasoline Storage Tank
LOCATION: Wheymouth-Rhymer Highway, Tutu
St. Thomas, Virgin Islands
AMOUNT: Unknown, greater than 100 gallons
WATER BODY: Caribbean Sea, Atlantic Ocean and
Groundwater

1. SITUATION:

A. See previous polrep.

2. ACTION TAKEN:

Monday, July 27, 1987

A. USEPA arrived on St. Thomas and met with Commissioner Smith of the Department of Planning and Natural Resources (DPNR) to coordinate the weeks activities and to exchange information on the status of work accomplished from the prior week.

- B. Commissioner Smith of DPNR issued an order to Texaco Caribbean, Inc. to cease tank removal activity at the Tutu Texaco Service Station located at Anna's Retreat. This order refrained the removal of tanks, soil, and/or any activity which would disturb the immediate area.

Tuesday, July 28, 1987

- C. USEPA received the preliminary results from the sampling conducted on July 22, 1987.
- D. USEPA met with Commissioner Smith and DPNR staff to discuss results of the sampling and to establish the next phase of activities to be accomplished.

Wednesday, July 29, 1987

- E. At 1000 hours, USEPA and DPNR met with Texaco to discuss the necessary sequence of events with must be met prior to initiating excavation at the Tutu Texaco Service Station.
- F. USEPA met with Commissioner Smith and DPNR staff to commence the development of the modified order to Texaco to include a Safety Plan, Sampling Plan, Action Levels and the assignment of an Operations Coordinator to work with EPA and DPNR to assure all local and federal regulations are complied with.
- G. At 1000 hours, a hearing was held at the DPNR office. Representatives from DPNR, USEPA, Texaco and Tutu Water Supply were in attendance. The hearing was held to ensure that Texaco was in full understanding of the order issued on July 27, 1987 and its restrictions. Texaco stated during the hearing they would fully comply with local and federal regulations and would cooperate with DPNR. The Commissioner announced a modified order would be forthcoming with regard to the specificity of the requirements of the first order.
- H. USEPA and DPNR became aware of another Texaco Service Station (Reese) located at Harwood Highway which was in the process of excavating tanks and installing new tanks due to a failed petro-tight test conducted earlier in July, 1987. Apparent local and federal regulations were violated during the inspection. The acknowledgement of apparent violations led to a meeting scheduled for Thursday morning between USEPA, DPNR and Texaco.

Thursday, July 30, 1987

- I. At 1000 hours, a meeting was held at the DPNR office. Representatives from DPNR, USEPA and Texaco were in attendance. At this time, EPA requested Texaco, Corp. be notified of these concerns which were substantiated by the lack of compliance with Virgin Islands regulations displayed at numerous sites on St. Thomas.

Friday, July 31, 1987

- J. EPA and DPNR contact well owners Tillett, Harthman, Eglin and Four Winds to discuss sampling results. A request for customer names who purchase their water was made. Each well owner was notified of the excess MCL levels of trichloroethylene found in their wells.
- K. DPNR issued an order to Mr. Eric Tillett, President of Tutu Waters to close the Tillett well until further notice.
- L. Commissioner Smith verbally requests USEPA to assume the lead on the contamination problem in the Tutu area.
- M. EPA recommended DPNR to compile the following: an inventory of all wells both private and commercial, and all underground storage tanks in the Tutu area.

3. FUTURE ACTION:

EPA returns to St. Thomas to undertake the contamination problem in the Tutu area and to assume the role of lead agency.

- EPA will initiate the compilation of inventory of wells and underground storage tanks in the area to identify potential sources of contamination.
- EPA will conduct further sampling of all potential wells for contamination and to further define the extent of contaminants.
- EPA will set up additional well water sampling in the Tutu area.

FINAL
POLREP _____

FURTHER
POLREPS
FORTHCOMING _____

X SUBMITTED BY

Paula A. Cammarata
Paula A. Cammarata
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: Aug 16, 1987

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: August 8, 1987

Region II
Response and Prevention Branch
Edison, New Jersey 08637

TO: C. Daggett, EPA
S. Luftig, EPA
R. Salkie, EPA
F. Rubel, EPA
P. Calabert, EPA
J. Marshall, EPA
ERD Washington
(E-Mail)
W. Sawyer, EPA
USCG 7th District (map)
J. Czapor, EPA
G. Zachos, EPA
B. Sprague, EPA
T. Taccone, EPA
A. Smith, DPNR
J. Lee, DOI
J. Zark, USCS
TAT

(201) 548-8730 - Commercial & FTS
24 Hour Emergency

POLREP NO. Three (3)
INCIDENT/SITE NO.: Tutu Well Site
POLLUTANT: Gasoline, Solvents, Volatile Organics
CLASSIFICATION: Major
SOURCE: Underground gasoline storage tank
LOCATION: Wheymouth-Rhymer Highway, Tutu
St. Thomas, Virgin Islands
AMOUNT: Unknown, greater than 100 gallons
WATER BODY: Caribbean Sea, Atlantic Ocean
and Groundwater

1. SITUATION:

A. See previous POLREP.

2. ACTION TAKEN:

I. Monday, August 3, 1987

A. U.S. EPA arrived on St. Thomas to assist the DPNR with the drafting of orders to Water Haulers, the modification order to Texaco, and the order to well owners identified to be closed.

3. EPA and the DPNR finalized logistics for meeting with Texaco representatives on Wednesday, August 5, 1987.

C. A meeting was held with EPA, Commissioner Smith and DPNR Staff to present the status report of current events and projected schedule of EPA activities. EPA requested two people from the DPNR to be assigned to the Tutu project.

II. Tuesday, August 4, 1987

A. EPA met with DPNR staff to explain the long and short term goals and formally introduce the Tutu well contamination problem to the staff. DPNR assigned Mr. Gregory Rhymer and Mr. Leonard Reed to the Tutu project. This will enable EPA to train these individuals as OSC for future regional actions.

B. EPA recommended DPNR to develop a Task Force. The Task Force is to be comprised of WAPA, VI Housing Authority, VITEMA, Department of Health, Fire Services, Governor's Office, Public Works and Caribbean Research Institute.

C. DPNR initiated activities to identify all commercial, institutional and private wells in the Tutu area. In addition, DPNR contacted well drillers on St. Thomas for further information.

D. EPA requested assistance from U.S. Geological Survey (USGS) hydrogeologic support. EPA initiated activities for the development of a cooperative agreement with U.S. Geological Survey.

E. DPNR initiated activities to identify all underground tanks in the Tutu area.

F. DPNR initiated activities to identify all sources of contamination.

G. DPNR receives petro-tight test results from Texaco indicating Tank #1 is "grossly leaking".

III. Wednesday, August 5, 1987

A. DPNR issued a modified order to Texaco Caribbean Inc.

B. EPA developed logistics for TAT support and sampling of water, soil, sludge, product and waste oil for VOAs and PCBs.

C. Representatives from Texaco, EPA and DPNR met to discuss the issuance of the modified DPNR order which requires Texaco to submit an extensive sampling/contingency plan prior to excavation activities.

D. Task Force meeting was held at the DPNR Office. Representatives from WAPA, VITEMA, DOH, Fire Services, CRI, DPNR and EPA attended. DPW and VIHA were unable to attend.

IV. Thursday, August 6, 1987

A. EPA and DPNR met with VIHA to discuss the laboratory results on July 22, 1987. Well #1 in the Tutu area was sampled. Approximately, 7,000-8,000 people reside within the Housing Projects.

B. EPA and DPNR met with DPW to discuss the identification of alternate water supplies and the feasibility of distributing this water. DPW has only two (2) standpipes for water haulers to unload water. There is also a storage tank adjacent to the Tutu area, which has a 5.5 million gallon or 12 day reserve capacity

C. Two additional underground tanks have been identified in the Tutu area; O'Henry Dry Cleaner, and Home Oil in Ft. Milner.

D. EPA recommended that the DPNR identify and contact the private well owners and suggest they not use their wells.

V. Friday, August 7, 1987

A. USGS completes preliminary assessments of wells.

B. Press release was issued to private well owners recommending they cease the use of their wells.

C. DPNR identified fourteen commercial wells, three institutional wells, six private wells, and one public well.

D. DPNR prepared orders to close the following wells: Eglin, Four Winds (Plaza Associates), Harthman, and VIHA. DPNR served order to Harthman and Eglin. Plaza Associates and VIHA cannot be reached.

E. EPA met with Asst. Commissioner Canagata to present a status report of the activities completed and to be scheduled.

VI. Saturday, August 8, 1987

A. DPNR identified ten potential and/or actual sources of contamination to the Tutu Turpentine Run Aquifer.

B. DPNR initiated the creation of a database for each well and source of contamination.

C. Seven well owners have been identified as potential alternate water suppliers.

D. DPNR continued to identify water haulers.

E. DPNR, EPA and EPA/TAT conducted a field investigation of the Tutu area for sampling strategy.

3. FUTURE PLANS AND RECOMMENDATIONS:

A. Complete inventory of all wells in the Tutu area.

B. Complete inventory and investigation of underground storage tanks.

C. Complete listing of water haulers and their customers.

D. DOE will assess health effects with ATSDR (CDC) by setting up a survey system which would further assess the demographics and the need for examination clinics.

FINAL POLREP _____ FURTHER
(TAT) POLREPS
FORTHCOMING X SUBMITTED BY: Carlos E. O'Neill
Carlos O'Neill, OSC
Response and Prevention
Branch

DATE RELEASED: 8-20-87

Thursday, July 30, 1987

- I. At 1000 hours, a meeting was held at the DPNR office. Representatives from DPNR, USEPA and Texaco were in attendance. At this time, EPA requested Texaco, Corp. be notified of these concerns which were substantiated by the lack of compliance with Virgin Islands regulations displayed at numerous sites on St. Thomas.

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- EPA will set up additional well water sampling in the Tutu area.

FINAL
POLREP _____

FURTHER
POLREPS
FORTHCOMING _____

X

SUBMITTED BY

Paula A. Cammarata

Paula A. Cammarata
On-Scene Coordinator
Response & Prevention Branch

DATE OSC RELEASED: Aug 16, 1987

U.S. ENVIRONMENTAL PROTECTION AGENCY

POLLUTION REPORT

DATE: August 8, 1987

Region II
Response and Prevention Branch
Edison, New Jersey 08637

TO: C. Daggett, EPA
S. Luftig, EPA
R. Salkie, EPA
F. Rubel, EPA
P. Calabert, EPA
J. Marshall, EPA
ERD Washington
(E-Mail)
W. Sawyer, EPA
USCG 7th District (map)
J. Czapor, EPA
G. Zachos, EPA
B. Sprague, EPA
T. Taccone, EPA
A. Smith, DPNR
J. Lee, DOI
J. Zark, USCS
TAT

(201) 548-8730 - Commercial & FTS
24 Hour Emergency

POLREP NO. Three (3)
INCIDENT/SITE NO.: Tutu Well Site
POLLUTANT: Gasoline, Solvents, Volatile Organics
CLASSIFICATION: Major
SOURCE: Underground gasoline storage tank
LOCATION: Wheymouth-Rhymer Highway, Tutu
St. Thomas, Virgin Islands
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and Groundwater

1. SITUATION:

A. See previous POLREP.

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C. Two additional underground tanks have been identified in the Tutu area; O'Henry Dry Cleaner, and Home Oil in Ft. Milner.

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FINAL POLREP _____ FURTHER
(TAT) POLREPS FORTHCOMING X SUBMITTED BY: Carlos O'Neill, OSC
Response and Prevention
Branch

DATE RELEASED: 8-20-87

CADA

TABLE 2-1
CURRENT WELL MONITORING PROGRAM
AND CLASSIFICATION AT TUTU WELL SITE

<u>WELL NAME</u>	<u>CLASSIFICATION</u>	<u>OPEN/CLOSED</u>
X 1. Dede	Public	Open
2. Steele	Private	Closed
3. Elgin #1	Commercial	Closed
Elgin #2	Commercial	Closed
Elgin #3	Commercial	Closed
4. Four Winds	Commercial	Closed
5. Smith	Private	Closed
X 6. Bryan	Commercial	Open
7. Harvey	Private	Closed
8. Tillet	Commercial	Closed
9. Harthman Estate	Private	Closed
X 10. Devcon #1	Commercial	Open
Devcon #3	Commercial	Open
11. VIHA #1	Institutional	Closed
VIHA #3	Institutional	Closed
12. Dench	Commercial	Pump/No Power
13. Ramsey	Private	Open
14. Harthman Crusher	Commercial	Closed
X 15. Alpha Leonard	Private	Open
16. Francois	Private	Open
17. Demitris	Commercial	Open
18. Rodriguez Auto	Private	Open
19. Harthman Bakery	Commercial	Closed
20. Mathias	Private	Open

H2O Cistern
connect to
well
computer
5 Sept

Definition of Classifications

Private: Wells which serve one or two houses.

Commercial: Wells that are used to yield water for sale.

Institutional: Wells owned and operated by a non-profit institution or governmental agency.

Public: Wells that are for public use.